

CLAIMS

1. A method for ultrasound imaging comprising the steps of:
 - transmitting ultrasound energy into a target volume at at least a first fundamental frequency;
- 5 receiving reflected and/or scattered ultrasound energy from the target volume; and
 - detecting components of the received signal at multiple harmonics of the fundamental frequency.
- 10 2. The method of claim 1 further comprising generating an image of the target volume using the multiple harmonic components of the received signal.
- 15 3. The method of claim 1 or claim 2 wherein the detected components comprise the second harmonic and at least one higher harmonic.
4. The method of claim 1 or claim 2 wherein the detected components comprise the third harmonic and at least one higher harmonic.
- 20 5. The method of claim 4 wherein the detected components comprise the third, fourth and fifth harmonics.
6. The method of any preceding claim applied in the direct imaging of tissue and/or fluids in a body.
- 25 7. The method of claim 6 applied in the direct imaging of tissue in a body.
8. The method of claim 6 or claim 7 applied without the use of artificial contrast agents introduced into the body.

9. A method for ultrasound imaging comprising the steps of:
 - transmitting ultrasound energy into a target volume at at least a first fundamental frequency;
 - 5 receiving reflected and scattered ultrasound energy from the target volume; and
 - detecting components of the received signal at one or more of the third harmonic, the fourth harmonic, the fifth harmonic or any higher harmonics of the fundamental frequency.
- 10 10. The method of claim 9 further comprising generating an image of the target volume using only the detected harmonic component.
- 11 11. The method of any preceding claim wherein the detected components relate to received ultrasound energy from tissue.
- 12 12. The method of any preceding claim in which the target volume comprises a human or animal body.
- 20 13. The method of any preceding claim in which the transmit energy is within the range of 1 to 2 MHz and the detected components of the received signal lie at least in the range 3.6 to 6 MHz.
- 25 14. The method of any preceding claim further including the step of separately detecting image information in at least two different groups of the second and higher harmonic frequency bands and generating a compound image from said at least two different groups.
- 30 15. The method of any preceding claim applied in the direct imaging of tissue and/or fluids in a body.

16. The method of claim 15 applied in the direct imaging of tissue in a body.

5 17. The method of claim 15 or claim 16 applied without the use of artificial contrast agents introduced into the body.

18. Apparatus for ultrasound imaging comprising:

a transmitter for transmitting acoustic energy into a target volume at
10 at least a first frequency;

a receive transducer for receiving reflected and/or scattered acoustic energy from the target volume over a plurality of frequencies; and

15 a filter for detecting components of the received signal at multiple harmonics of the fundamental frequency.

19. The apparatus of claim 18 further comprising signal processing means for generating an image of the target volume using the multiple harmonic components of the received signal.

20 20. The apparatus of claim 18 or claim 19 wherein the filter is adapted to detect the second harmonic and at least one higher harmonic of the fundamental frequency in the received signal.

25 21. The apparatus of claim 18 or claim 19 wherein the filter is adapted to detect the third harmonic and at least one higher harmonic of the fundamental frequency in the received signal.

22. The apparatus of claim 21 wherein the detected components comprise the third, fourth and fifth harmonics.

23. Apparatus for ultrasound imaging comprising:
- a transmitter for transmitting ultrasound energy into a target volume at at least a first fundamental frequency;
- a receive transducer for receiving reflected and/or scattered
- 5 ultrasound energy from the target volume; and
- a filter for detecting components of the received signal at one or more of the third harmonic, the fourth harmonic, the fifth harmonic or higher harmonics of the fundamental frequency.
- 10 24. The apparatus of claim 23 in which the detected components comprise the third, fourth and fifth harmonics.
- 15 25. The apparatus of claim 23 further comprising means for generating an image of the target volume using only the detected harmonic component.
- 20 26. The apparatus of any one of claims 18 to 25 in which the transmitter is adapted to transmit acoustic energy within the range 1 to 2 MHz and the receive transducer is adapted to detect components at least within the range 3.6 to 6 MHz.
- 25 27. The apparatus of any one of claims 18 to 26 further including means for separately detecting image information in at least two different groups of the second and higher harmonic frequency bands and generating a compound image from said at least two different groups.
- 30 28. Apparatus substantially as described herein with reference to the accompanying drawings.
29. A method substantially as described herein with reference to the
- 30 accompanying drawings.